in which the partition defines a surrounding sidewall for each cell, opposed portions of the respective sidewalls of the plural cells, aligned in both the row and column directions, having a larger pattern width portion than remaining portions thereof; and

forming the partition by baking the patterned layer and causing the material, due to the heat shrink property thereof, to have more greatly reduced heights in the sidewall portions having the larger pattern width portions, relative to the heights of portions of the sidewalls having relatively smaller pattern width portions, thereby defining air paths that travel through all of the cells in each of the row and column directions, between the more greatly reduced height sidewall portions and an inner surface of the second substrate, when assembled in parallel spaced relationship with the first substrate and with the partition disposed therebetween.

REMARKS

In accordance with the foregoing, the specification, claims and Abstract have been amended to improve form and do not introduce new matter. Approval and entry of same are respectfully requested.

ITEM 1: SPECIFICATION OBJECTIONS

The objection requiring a change of "im" to --μm-- has been made in the foregoing.

In response to the Examiner's assertion that the Examiner could not find in the specification a disclosure of "the height being more than 5% of the maximum height", applicants respectfully direct the Examiner's attention to the disclosure at page 9 of the specification, lines 19-23. Examining the h1 and H2 heights of respective walls 291 and 292 at page 9 of the specification, a 10 micron difference represents 7.7% of the 130 micron height and 7.14% of the 140 micron height. It is respectfully submitted that the foregoing provides clear support for the "more than 5%" limitation of claim 2/1.

ITEM 3: CLAIM OBJECTIONS

The objections to the claims identified in item 3 of the Action are submitted to be overcome by the foregoing claim amendments.

PRIOR ART REJECTIONS

Item 5 rejects claims 1 and 4-9 for anticipation under 35 USC § 102(e) by Sano et al. (USP 6,249,264).

Item 7 of the Action rejects claims 2 and 3 for obviousness under 35 USC § 103(a) in view of Sano et al.

Item 8 of the Action rejects claims 10 and 11 for obviousness under 35 USC § 103(a) over Sano et al. in view of Murai et al.

The rejections are respectfully traversed.

ARGUMENTS

A PDP 1B shown in Fig. 8 of Sano et al. has first barrier ribs 29 for defining columns and second barrier ribs 50 for defining rows. The height Hmain of the first barrier ribs is constant while the height Hsub of the second barrier ribs is smaller than the height Hmain. In other words, a second top portion 50T of a second barrier rib 50 is lower than a first top portion 29T of a first barrier rib 29. Since the height of the first top portion 29T of the first barrier rib 29 is uniform, an air exhaustion path pattern of the PDP 1B is a stripe pattern in which independent band-like paths extend along the parallel columns defined by the spaced first barrier ribs 29 and thus only in the direction D2.

By contrast to Sano, and as shown in Fig. 1 of the present application, PDP 1 has vertical walls 291, the height of which is not constant; instead, the vertical walls 291 are indented at boundaries thereof between the rows. The height of the indented portions is equal to that of the horizontal walls 292, which are lower than the vertical walls 291. Thus, paths in both the row and column directions are formed and which are interconnected with each other, forming a mesh-like path.

Sano et al. in fact is a "teaching-away" from the mesh-pattern partition of the present invention forming plural gas-filled cells, each cell having a surrounding partition sidewall, portions of which form mesh-like air paths extending through all of the plural gas-filled cells and to a periphery of the partition, as recited in independent claim 1.

Independent claim 14 recites in somewhat more detail that the mesh-patterned partition provides a cell arrangement of "plural gas-filled cells in plural, transverse rows and columns" and in which "spaced and opposed portions of respective sidewalls of the plural cells, aligned in both the row and column directions, define "corresponding air paths in the row and column directions, that travel through all of the gas-filled cells to a periphery of the partition."

Sano et al., as noted above, is a "teaching-away" from the mesh-patterned partition of the present invention, teaching that only the single direction of air paths achieved by reducing the height h of the barrier ribs of the second type 50 to be smaller than the height H of the barrier ribs of the first height 29 to secure a flow path (see column 24, line 62- column 25, line 10, and particularly the last sentence). Sano et al., moreover, fail to teach that an air exhaustion path is formed so as to continuously extend over the whole length of the display surface in the vertical and horizontal directions as in claims 13 and 14.

Whereas Sano et al. is relied upon in item 5 of the Action for anticipation, it is clear that Sano et al. contains no teaching of the mesh pattern of the present invention and thus the anticipation rejection should be withdrawn.

As to item 7 of the Action, it is respectfully submitted that the specific heights recited in claims 2 and 3 are in accordance with a preferred embodiment of the invention and since Sano et al. does not teach any specific height whatsoever, it is incapable of supporting an obviousness rejection of a particular height as specified in claims 2 and 3. Furthermore, no grounds are set forth in the Action for the alleged obviousness of the specific height differences set forth in claims 2 and 3; indeed, the Examiner merely asserts "it appears that the invention would perform equally well with the height members [29 and 50] of Sano et al. "To the contrary, applicant has provided ample disclosure of the importance of certain minimum height differences being established to provide the air flow paths. (See specification at page 8, line 18 to page 10, line 28)

Item 8 of the Action rejects claims 10 and 11 for obviousness under 35 USC § 103(a) over Sano in view of Murai et al. (USP 5,754,003). The rejection is respectfully traversed.

No *prima facie* basis of obviousness of the combination of Sano et al. and Murai et al. has been set forth. Indeed, there is no basis set forth in the rejection of item 8 as to how the process of Murai et al. could be used to form the structure of Sano et al.--which the Action concedes does not disclose any specific steps for manufacturing the plasma display panel disclosed therein. The bare assertion that the method of Murai et al. would be obvious to use

with Sano et al. "in order to reduce costs" (item 8 of the Action) is respectfully submitted to be without basis as a ground to render the combination obvious. There being no showing of how the method of Murai et al. would be used to make the structure of Sano et al., there is correspondingly no basis for the alleged obviousness of the combination.

Furthermore, Murai et al. (USP 5,754,003) has no disclosure or even suggestion of formation of mesh-like air paths. Murai et al. describes a general method for forming partition walls, the method including a step of heat-treating, and describes height variation of partition walls produced in the formation of partition walls. Murai et al. teaches that each of plural gaps, between each of partition walls and a front substrate, is bridged so as to seal completely a space defined by each of the partition walls. More specifically, according to Murai et al., an air path generated incidentally is closed and sealed--contrary to the teaching and claimed structure of the present invention pursuant to which an air path is formed purposely. Therefore, Murai et al. is silent with regard to a method for forming a partition forming mesh-like air paths as recited in claim 1, and more specifically as in claim 14, air paths "in the row and column directions." Indeed, the teaching of Murai et al. to seal the space defined by each of the partition walls is a "teaching-away" of the present invention and thus fails to supplement the corresponding "teaching-away" deficiencies of Sano.

CONCLUSION

There being no other objections or rejections, it is respectfully submitted that the application is in condition for allowance, which action is earnestly solicited.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: November 12, 2002

By: _____
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT:

A plasma display panel [is provided that] has a good productivity of partition formation and air exhaustion process and realizes a bright and stable display. A discharge gas is filled in a gap between two substrates. A mesh-patterned partition is arranged on the inner surface of one of the substrates for dividing the gap into plural squares corresponding to a cell arrangement. The partition has low portions [for] forming a mesh-like air path that travels through all of the gas-filled space enclosed by the partition, in a plan view.

IN THE SPECIFICATION:

Please AMEND the paragraph beginning at page 3, line 16, as follows:

There is a method of forming the air path by cutting a part of the partition. However, this method may increase the number of manufacturing steps for the cutting process and may reduce the manufacturing yield since the partition can be broken by the cutting process.

Please AMEND the paragraph spanning pages 3-4, as follows:

According to the present invention, a mesh-patterned partition is arranged on the inner surface of one of the substrates. The partition has low portions that form a mesh-like air path that travels through all of the gas-filled space enclosed by the partition in a plan view. For example, in a simple check pattern in which a line along the horizontal direction and a line along the vertical direction cross each other, the portion corresponding to the line along the horizontal direction is made low. In this case, the pattern width (the line width) of the portion corresponding to the line along the horizontal direction is made thicker than the pattern width of the portion corresponding to the line along the vertical direction so as to generate a height difference. The shrink quantity in the thick portion is smaller in the width direction but is larger in the height direction than the thin portion.

Please AMEND the paragraph beginning at page 6, line 6, as follows:

The address electrodes A are arranged on the inner surface of the glass substrate 21 of the back substrate structure 20 as one for each column and are covered with a dielectric layer 24. On the dielectric layer 24, the partition 29 is disposed, which has a grid pattern with partially low profile structure that is unique to the present invention. The partition 29 is made of a baked material of a low melting point glass and includes a portion for dividing the discharge space into columns (hereinafter referred to as a vertical wall) 291 and a portion for dividing a discharge space into rows (hereinafter referred to as a horizontal wall) 292. The intersection of the vertical wall 291 and the horizontal wall 292 is a common part of them. The horizontal wall 292 is lower in height (i.e., is shorter) than the vertical wall 291 by approximately 10 [im] μm. The upper surface of the dielectric layer 24 and the side face (i.e., side walls) of the partition 29 are covered with red, green and blue colors of fluorescent material layers 28R, 28G and 28B for color display. The italic letters (*R, G* and *B*) in Fig. 1 signify light emission colors of the fluorescent materials. The color arrangement has a repeating pattern of red, green and blue colors in such a way that the cells in a column have the same color. The fluorescent material layers 28R, 28G and 28B are excited by ultraviolet rays generated by the discharge gas in the corresponding cell and emit light.

Please AMEND the paragraph beginning at page 6, line 30, as follows:

As shown in Fig. 2, the metal film 42 of each of the display electrodes X, Y is overlaid on the partition 29 so as [to avoid shading and] to [blind] cover the partition 29 partially, for reducing reflection of external light rays, and to avoid overlapping onto the fluorescent material on the partition sidewalls. The transparent conductive film 41 is patterned in such a way that the portion for the surface discharge is substantially separated from the portion overlaid on the metal film 42, for suppressing discharge current so as to enhance the efficiency of light emission. In the case of 42 inch wide VGA type, the portion for the display discharge of the transparent conductive film 41 is separated from the horizontal wall 292 by a distance more than 30 [im] μm, so that energy loss is largely reduced compared with the case where the distance is less than 30 [im] μm. It is desirable that the distance between the horizontal wall 292 and the transparent conductive film 41 is set so that the discharge current is reduced by more than 5%.

Please AMEND the paragraph spanning pages 7-8, as follows:

As shown in Fig. 3, the partition pattern is a grid pattern in which each square of the grid pattern encloses a cell C individually. However, it is not a simple check pattern. Namely, the inter-row portion 293 (the portion between the cells aligned in the column direction) of the partition 29 includes two horizontal walls 292 and a part of the vertical wall 291. The plan view pattern of the inter-row portion 293 is made as a ladder pattern, and a space 33 is formed between the gas-filled space 32 that corresponds to each of the cells C aligned in the column direction. Since the dielectric constant of the discharge gas is approximately one eighth of that of a low melting point glass that is a common material of the partition, capacitance between the display electrodes of the neighboring rows is reduced, so that a waste of power consumption can be reduced and response of drive control can be improved. In the check pattern, the side face of the vertical wall 291 and the side face of the horizontal wall 292 respectively are provided with a fluorescent material, so that the light emission area is enlarged and the light emission efficiency can be improved.

Please AMEND the paragraph beginning at page 8, line 18, as follows:

In the PDP 1 of this embodiment, the inter-row portion 293 of the partition 29 is made approximately 10 μm lower than other portions, i.e., made approximately 7% lower, relative to the maximum height (140 μm) of the partition 29. Thereby, [thereby forming] an air exhaustion path 90 [that] is formed which has a grid shape in the plan view for enabling air exhaustion both in the column direction and in the row direction. The width W20 of the inter-row portion 293 is substantially large, and the inter-row portion 293 is substantially lowered, relative to the other portions, and therefor, the air exhaustion conductance is substantially the same as the stripe pattern. Concrete dimension of the partition 29 is as follows.

Please AMEND the paragraph beginning at page 9, line 19, as follows:

It is important that the width W20 of the inter-row portion 293 is substantially larger than the width W11 of the vertical wall 291, so that the difference between the widths makes a height difference between the inter-row portion 293 and other portions. Namely, in a baking process of a material such as a general low melting point glass having a heat shrink property, as shown schematically in Fig. 5, the shrink quantity in the height direction depends on the width of the

pattern. The shrink can be generated both in the width direction and in the height direction as a whole in the portion 29A having a small pattern width. In contrast, in the portion 29B having a large pattern width, the [shirk] shrink in the width direction is suppressed more at the portion closer to the center in width direction, so that the shrink is generated more in the height direction, compensating for the suppression in the width direction. Therefore, the thick portion 29B becomes lower in height than the thin portion 29A. In addition, an isotropic shrink occurs in the upper portion of the wall material layer since the shrink can easily occur in any direction, while the shrink in the direction of the substrate surface is suppressed in the bottom portion due to the bond of the substrate. Therefore, the shrink quantity in the height direction becomes larger than the shrink quantity in the direction of the substrate surface. Namely, even if the width of the upper surface is substantially uniform before baking, and if the widths of the bottom surface are different, the height after baking of the material layer having larger width of the bottom surface becomes lower than the material layer having smaller width of the bottom surface. Considering this fact, the pattern width of the partition is defined as the dimension at the position whose distance from the bottom surface is 10% of the height in this specification. It is desirable that the pattern width of the thick portion is set to be more than 130% of the pattern width of the thin portion so that a difference of height is generated that is sufficient for air exhaustion. In the case of the above-mentioned partition size, two horizontal walls 292 and the portion between them (a part of the vertical wall 291) are shrunk in the same way in the height direction, and a partition 29 is obtained that has two inter-row portions 293 having low profile as a whole in the inter-row portion 293 of the ladder pattern.

Please AMEND the paragraph beginning at page 11, line 3, as follows:

Concerning optical characteristics of the partition 29, it is desirable that it is semitransparent having the absorptance of visual light at approximately 80% per 30 [im] μm of film thickness. If it is semitransparent, light rays generated at the vicinity of the top of the partition pass the partition and contribute to improvement of the luminance, while external rays that entered the partition are reflected by the bottom surface of the partition and are absorbed by the partition before reaching the front surface. Therefore, a display having a good contrast can be realized.

Please AMEND the paragraph beginning at page 11, line 13, as follows:

The process of forming the partition 29 is as follows.

(1) Forming the partition material layer having the thickness of approximately 200 μm made of a uniform paste mixture of a low melting point glass powder having the components shown in Table 1 and a vehicle so as to cover the dielectric layer 24. The partition material layer may be formed by any method such as a screen printing method, a laminating method in which a green sheet is transferred, or other method.

(2) Drying the partition material layer, and then sticking thereto a photosensitive dry film (or a resist material is applied), and forming a cut mask of the grid pattern corresponding to the partition 29 by using [a] photolithography, including exposure and development. The mask pattern size is set larger that the desired partition size considering the heat shrink quantity.

(3) Grinding the non-masking portion of the partition material layer by a sandblaster until the dielectric layer 24 is exposed (the partition material layer is patterned).

(4) Performing a heating process according to the baking profile shown in Fig. 6 to bake the partition material layer so that the partition 29 is formed.

IN THE CLAIMS

1. (ONCE AMENDED) A plasma display panel having a display surface, comprising:

a pair of spaced substrates defining a gap therebetween;

a discharge gas [being] filled in [a] the gap between the substrates; and

a mesh-patterned partition [arranged on the], disposed between respective inner [surface of one] surfaces of the substrates [for] and extending over all of the display surface, dividing the gap into [plural squares corresponding to] a cell arrangement [, wherein the partition is a structure having low portions lowered for forming a] of plural gas-filled cells, each cell having a surrounding partition sidewall, portions of the respective surrounding sidewall of the plural gas-filled cells forming mesh-like air [path that travels all gas-filled space enclosed by the partition in a plan view] paths extending through all of the plural gas-filled cells and to a periphery of the partition.

2. (ONCE AMENDED) The plasma display panel according to claim 1, wherein [the] portions of the partition sidewalls are lowered to form the mesh-like air paths, a difference between [the] respective heights of the lowered portions and the other portions upper surface of the partition sidewalls is more than 5% of [the] a maximum height of the partition.

3. (ONCE AMENDED) The plasma display panel according to claim [1] 12, wherein [the] portions of the partition sidewalls are lowered to form the mesh-like air paths, a difference between [the] respective heights of the lowered portions and an upper surface of the partition [is] sidewall being more than 10 μm.

4. (ONCE AMENDED) The plasma display panel according to claim 1, wherein a fluorescent material is arranged on [the] a row direction side and [the] a column direction side of the respective partition [in] sidewall of each [cell that constitutes the display surface] of the cells.

5. (ONCE AMENDED) The plasma display panel according to claim 1, wherein [the plan view pattern of the partition is a check pattern that divides the gap into] the cells in the row direction and in the column direction [of the] form a matrix display and an inter-row portion of the partition, that [is] forms a boundary wall between adjacent rows, is of a lower height than other portions of the partition.

6. (ONCE AMENDED) The plasma display panel according to claim 5, wherein the inter-row portion [has a plan view pattern enclosing] defines at least one space for each column.

7. (ONCE AMENDED) The plasma display panel according to claim 6, wherein the [plan view pattern of] the inter-row portion [is] has a ladder pattern.

8. (ONCE AMENDED) The plasma display panel according to claim 5, wherein the partition is arranged on [the] a back substrate, an electrode including a transparent conductive film and a metal film [straddling over] extending over all columns is arranged on the front substrate, and the metal film and the inter-row portion are overlaid [in the plan view].

9. (ONCE AMENDED) The plasma display panel according to claim 1, wherein the partition is formed of a baked material having a heat shrink property, and [the] a width of the [low] reduced height portions of the partition sidewalls is [wider] greater than [that] a width of the other portions of the sidewalls of the partition.

10. (ONCE AMENDED) A method for manufacturing a plasma display having a display screen, [according to claim 1, the method] comprising [the steps of]:

forming a layer [made] of a [partition] material having a heat shrink property on a substrate;

patterning the layer to [be a mesh pattern having a large pattern width portion at the ring-shaped pattern enclosing a cell in the plan view] define a mesh-patterned partition extending over all of the display screen and defining a cell arrangement of plural cells, each cell having a partition sidewall, portions of the respective surrounding sidewalls of the plural cells forming mesh-like air paths extending through all of the plural cells and to a periphery of the mesh-patterned partition; and

forming the partition by baking the patterned layer.

11. (ONCE AMENDED) The method according to claim 10, wherein the patterning [step includes the steps of] further comprises placing a cutting mask corresponding to the [mesh pattern] cell arrangement on the layer, and cutting non-masked portions of the layer by sandblasting.

Please ADD the following NEW claims:

--12. (NEW) The plasma display panel according to claim 1, wherein spaced, opposed portions of the respective sidewalls of the plural cells, aligned in row and column directions, are of a reduced height, relative to other portions of the respective sidewalls of the plural cells, thereby forming corresponding air paths.

13. (NEW) The plasma display panel according to claim 12, wherein the air paths extend continuously over a complete length of each of the row and column directions.

14. (NEW) A plasma display panel having a display surface, comprising:

a pair of substrates having parallel, spaced and opposed respective inner surfaces defining a gap therebetween;

a discharge gas filled in the gap between the substrates; and

a mesh-patterned partition disposed between the respective inner surfaces of the substrates and dividing the gap into a cell arrangement of plural gas-filled cells in plural, transverse rows and columns covering the display surface and in which the partition defines a surrounding sidewall for each cell, spaced and opposed portions of the respective sidewalls of the plural cells, aligned in both the row and column directions, defining corresponding air paths in the row and column directions, that travel through all of the gas-filled cells to a periphery of the partition.

15. (NEW) A method for manufacturing a plasma display having a display screen having a pair of first and second substrates and a discharge gas filled in a gap between the substrates, comprising:

forming a layer, of a material having a heat shrink property, on a major surface of the first substrate;

patterning the layer to define a mesh-patterned partition arranged on the inner surface of one of the substrates, dividing the gap into a cell arrangement of plural gas-filled cells in plural, transverse rows and columns and covering the display surface and in which the partition defines a surrounding sidewall for each cell, opposed portions of the respective sidewalls of the plural cells, aligned in both the row and column directions, having a [layer] larger pattern width portion than remaining [portion] portions thereof; and

forming the partition by baking the patterned layer and causing the material, due to the heat shrink property thereof, to have more greatly reduced heights in the sidewall portions having the larger pattern width portions, relative to the heights of portions of the sidewalls having relatively smaller pattern width portions, thereby defining air paths that travel through all of the cells [aligned] in each [selected] of the row and column [direction] directions, between the more greatly reduced height sidewall portions and an inner surface of the second substrate, when assembled in parallel spaced relationship with the first substrate and with the partition disposed therebetween.--